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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants	:	Eric R. George Robert L. Ballard
Serial No.	:	10/011,659
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For	:	NANOCOMPOSITE REINFORCED POLYMER BLEND AND METHOD FOR BLENDING THEREOF
Group	:	1722

INFORMATION DISCLOSURE STATEMENT

Trenton, New Jersey
February 20, 2002

Commissioner for Patents
Washington, D. C. 20231

Sir:

This statement represents that the prior art listed herein includes, in the opinion of the applicant, the closest prior art of which the applicant is aware. The patents enclosed in this report are listed as follows:

PATENT NO.	PATENTEE	ISSUE DATE
4,472,538	Kamigaito et al	9/18/84
4,810,734	Kawasumi et al	3/7/89
5,385,776	Maxfield et al	1/31/95
5,554,120	Chen et al	9/10/96
5,556,383	Wang et al	9/17/96
5,565,523	Chen et al	10/15/96
5,578,672	Beall et al	11/26/96
5,698,624	Beall et al	12/16/97
5,747,560	Christiani et al	5/5/98
5,747,591	Chen et al	5/5/98
5,830,182	Wang et al	11/3/98
5,877,248	Beall et al	3/2/99
5,880,197	Beall et al	3/9/99
5,951,941	Wang et al	9/14/99

6,010,521	Lee et al	1/4/00
6,013,728	Chen et al	1/11/00
6,060,549	Li et al	5/9/00
6,200,290	Burgmeier	3/13/01
6,210,396	MacDonald et al	4/3/01
6,217,547	Lee	4/17/01
6,271,298	Powell	8/7/01

United States Patent No. 4,472,538 was patented on September 18, 1984 to O. Kamigaito et al and assigned to Kabushiki Kaisha Toyota Chuo Kenkyusho on a "Composite Material Composed Of Clay Mineral And Organic High Polymer And Method For Producing The Same". This patent is one of the original patents on the use of nanocomposites 15 to 20 years ago. This patent discloses a method for producing composite material with high heat and abrasion resistance and high flame retardation and other enhanced mechanical properties. In the process disclosed in this patent clay material with laminated aluminum silicate layers containing water or between the layers is mixed to allow the organic monomer to be adsorbed on an intercalated between the aluminum silicate layers. It is in a liquid gas or solution when brought in contact therewith. The clay material is then contacted with a specific silane compound for promoting polymerization of the organic monomer. In this manner a composite material is formed composed of a clay material having an organic high polymer adsorbed thereon and intercalated and uniformly and chemically bonded therewith in a secure manner. The present invention is distinguishable from this patent since the present invention discloses a uniquely configured

nanocomposite reinforced polymer or blend which is produced for specific engineering purposes having enhanced mechanical properties such as stiffness, elasticity, tensile strength and/or lubricity. In the present invention these parameters can be controlled by metering the polymers and the nanocomposite polymers prior to and during extrusion. This process provides a nanocomposite reinforced polymer blend which can be accurately controlled within specific parameters. Such a material is not in any way taught by United States Patent No. 4,472,538 and, as such, the present invention is deemed to be patentably distinguishable thereover.

United States Patent No. 4,810,734 was patented on March 7, 1989 to M. Kawasumi et al and assigned to Kabushiki Kaisha Toyoto Chuo Kenkyusho on a "Process For Producing Composite Material". This patent is also one of the original patents granted on the concept of use of nanocomposites for material property enhancements or changes. This patent discloses a method for producing composite material including contacting a layered clay material with a swelling agent in the presence of a dispersal medium. The layered clay material should have a cation exchange capacity of between 50 to 200 milliequivalents per 100 grams. This process forms a complex which is swollen by a molten monomer of a polymer or by a mixture of the monomer and a dispersion medium. The complex containing the dispersion is mixed with the monomer of a polymer and thereafter the monomer is polymerized in the mixture. The above patent does not show the

novel composition of matter disclosed in the present invention of a polymer reinforced with nanocomposite material which can be formed into a blend where various mechanical properties can be carefully and accurately controlled by varying the polymers and nanocomposite polymers prior to the extrusion and during the extrusion by varying the process for forming thereof. This unique composition of matter is finally formed in such a manner that specific parameters thereof such as mechanical properties can be carefully controlled by varying the mixing proportions with pure virgin polymers and copolymers. The unique process and reinforced polymer blend set forth in this invention is not in any way shown in United States Patent No. 4,810,734. As such the present invention is deemed to be patentably novel over the specification and claims of said patent.

United States Patent No. 5,385,776 was patent on January 31, 1995 to M. Maxfield et al and assigned to AlliedSignal Inc. on "Nanocomposites Of Gamma Phase Polymers Containing Inorganic Particulate Material". This patent discloses some of the original work performed by AlliedSignal in regard to nanocomposites based on nylon 6. The material of this patent comprises a polymer matrix formed of a gamma phase polyamide with approximately 10 percent by weight of the polyamide in the gamma phase. A matrix of inorganic particulate material is dispersed therein for forming the composite material. The present invention provides a unique process for customizing the mechanical properties or other properties of a nanocomposite

polymer blend in order to achieve specific target values for these mechanical properties or produce the mechanical properties within a predefined parameter envelope when considering such properties as stiffness, elasticity, tensile strength and lubricity. These properties can be varied by carefully monitoring and controlling the mixing proportions of pure virgin polymers and copolymers while at the same time carefully monitoring and controlling the parameters of the extrusion process to further carefully control the final values for certain mechanical properties thereof. There is no disclosure of this method or composition of matter in United States Patent No. 5,385,776 and for this reason the present invention as claimed is deemed to be patentable thereover.

United States Patent No. 5,554,120 was patented on September 10, 1996 to Z. Chen et al and assigned to Advanced Cardiovascular Systems, Inc. on "Polymer Blends For Use In Making Medical Devices Including Catheters And Balloons For Dilatation Catheters". This patent discloses a polymeric combination component for use in medical instruments such as catheters and balloons for dilatation catheters. It includes a first crystalline polymeric component and a second polymeric softening component. A third component can be included for enhancing compatibility of the blending of the first two components together. Also the polymer blend can be irradiated for the purpose of varying the specific properties of the material especially when used for balloon material for increasing the

pressure limitations on bursting thereof. In the present invention a unique composition of matter is disclosed for a nanocomposite reinforced polymer and blends produced thereof for engineering purposes as well as a method for providing such material with mechanical properties carefully controlled. These mechanical properties can include stiffness, elasticity, tensile strength and lubricity or other mechanical properties. They can be varied by metering the polymers and nanocomposite polymers prior to the extrusion as well as during the extrusion. The extrusion process can have the parameters thereof modified to vary the resultant mechanical properties in a predictable manner. These parameters so modified may include time, temperature, as well as overall cool-down time, as well as varying the draw-down extrusion ratio. In this manner a multi layer extrusion can be produced having mechanical properties in the final resultant nanocomposite reinforced polymer blend which are accurately controlled by varying these parameters as well as by varying the mixing proportions with pure virgin polymers and copolymers. In this manner a proprietary process is disclosed which provides a method for customizing of the mechanical properties of such a nanocomposite reinforced polymer blend to reach specific values or to reach specific evaluations within a minimal tolerance envelope as desired. In particular the process may allow certain values for mechanical properties to be achieved which may exceed the values of the individual components of the resultant polymer blend and, as such, synergistically provide a resultant polymer

blend. This unique method and the composition of matter produced thereby is patentably distinct from all aspects of the disclosure of United States Patent No. 5,554,120 and, for this reason, the present invention as claimed is not deemed to be taught by the specification or claims of this patent and for this reason the present invention is deemed to be patentable thereover.

United States Patent No. 5,556,383 was patented on September 17, 1996 to L. Wang et al and assigned to Scimed Lifesystems, Inc. on "Block Copolymer Elastomer Catheter Balloons". The copolymer elastomer material of this patent is used for medical devices and includes a length of tubing thereof used in the medical device including radial expansion of the tubing under pressure. The polymer includes a block copolymer thermoplastic material which includes a polyamide hard segment of molecular weight in the range of 500 to 8000. It includes a polyester soft segment of molecular weight from 500 to 2500. A block copolymer is included with a flexural modulus of less than 150,000 pounds per square inch. The block copolymer includes a hardness of greater than 60 on the Shore D scale. The percentage by weight of the block polymer attributable to the hard segments can be as low as 50 percent and as high as 95 percent. The present invention provides a unique process for customizing the mechanical properties or other properties of a nanocomposite polymer blend in order to achieve specific target values for these mechanical properties or produce the mechanical properties within a predefined parameter envelope when considering such

properties as stiffness, elasticity, tensile strength and lubricity. These properties can be varied by carefully monitoring and controlling the mixing proportions of pure virgin polymers and copolymers while at the same time carefully monitoring and controlling the parameters of the extrusion process to further carefully control the final values for certain mechanical properties thereof. There is no disclosure of this method or composition of matter in United States Patent No. 5,556,383 and for this reason the present invention as claimed is deemed to be patentable thereover.

United States Patent No. 5,565,523 was patented on October 15, 1996 to Z. Chen et al and assigned to Advanced Cardiovascular Systems, Inc. on "Polymer Blends For Use In Making Medical Devices Including Catheters And Balloons For Dilatation Catheters". The copolymer elastomer material used in the '383 patent includes a first component at greater than 10 percent by weight which is polymeric and is a polyester or polyamide from the group of dicarboxylic acids and at least one glycol. These polyamides are branched or straight chained polyamides with a molecular weight of at least 5000. The other component at greater than 5 percent of the total weight comprises a polymer compound having a hardness of less than 75D under the Shore hardness standard. The second component is a polyolefin with a density less than 0.93. The material is irradiated such that fatigue of the catheter material is enhanced. The present invention is distinguishable from this patent since the present

invention discloses a uniquely configured nanocomposite reinforced polymer or blend which is produced for specific engineering purposes having enhanced mechanical properties such as stiffness, elasticity, tensile strength and/or lubricity. In the present invention these parameters can be controlled by metering the polymers and the nanocomposite polymers prior to and during extrusion. This process provides a nanocomposite reinforced polymer blend which can be accurately controlled within specific parameters. Such a material is not in any way taught by United States Patent No. 5,565,523 and, as such, the present invention is deemed to be patentably distinguishable thereover.

United States Patent No. 5,578,672 was patented on November 26, 1996 to G. Beall et al and assigned to Amcol International Corporation on "Intercalates; Exfoliates; Process For Manufacturing Intercalates And Exfoliates And Composite Materials Containing Same". The intercalate of this patent is capable of being exfoliated into individual phyllosilicate platelets. The intercalate is formed by extruding a mixture of phyllosilicates. An intercalate polymer has a functionality selected from a group consisting of an aromatic ring. Water is present in the mixture at least 20% by weight based upon the dry weight of the phyllosilicate. The polymer present in the mixture is in an amount of 16% to 80% by weight to achieve sorption of the polymer between adjacent spaced layers of the phyllosilicate for expanding the spacing between the predominance of the

adjacent phyllosilicate platelets to at least 10 angstroms. The present invention is distinguishable from this patent since the present invention discloses a uniquely configured nanocomposite reinforced polymer or blend which is produced for specific engineering purposes having enhanced mechanical properties such as stiffness, elasticity, tensile strength and/or lubricity. In the present invention these parameters can be controlled by metering the polymers and the nanocomposite polymers prior to and during extrusion. This process provides a nanocomposite reinforced polymer blend which can be accurately controlled within specific parameters. Such a material is not in any way taught by United States Patent No. 5,578,672 and, as such, the present invention is deemed to be patentably distinguishable thereover.

United States Patent No. 5,698,624 was patented on December 16, 1997 to G. Beall et al and assigned to AMCOL International Corporation on "Exfoliated Layered Materials And Nanocomposites Comprising Matrix Polymers And Said Exfoliated Layered Materials Formed With Water-Insoluble Oligomers And Polymers". The composite material disclosed in the '624 patent includes a matrix polymer greater than 40 percent by weight of the total material and includes .05% to 60% by weight of exfoliated platelets of a phyllosilicate material. The platelets are derived from intercalate formed by contacting a phyllosilicate and a water-insoluble intercalant polymer-containing composition without reacting the phyllosilicate with

an onium ion or silane coupling agent. In the present invention a unique composition of matter is disclosed for a nanocomposite reinforced polymer and blends produced thereof for engineering purposes as well as a method for providing such material with mechanical properties carefully controlled. These mechanical properties can include stiffness, elasticity, tensile strength and lubricity or other mechanical properties. They can be varied by metering the polymers and nanocomposite polymers prior to the extrusion as well as during the extrusion. The extrusion process can have the parameters thereof modified to vary the resultant mechanical properties in a predictable manner. These parameters so modified may include time, temperature, as well as overall cool-down time, as well as varying the draw-down extrusion ratio. In this manner a multi layer extrusion can be produced having mechanical properties in the final resultant nanocomposite reinforced polymer blend which are accurately controlled by varying these parameters as well as by varying the mixing proportions with pure virgin polymers and copolymers. In this manner a proprietary process is disclosed which provides a method for customizing of the mechanical properties of such a nanocomposite reinforced polymer blend to reach specific values or to reach specific evaluations within a minimal tolerance envelope as desired. In particular the process may allow certain values for mechanical properties to be achieved which may exceed the values of the individual components of the resultant polymer blend and, as such, synergistically provide a resultant polymer

blend. This unique method and the composition of matter produced thereby is patentably distinct from all aspects of the disclosure of United States Patent No. 5,698,624 and, for this reason, the present invention as claimed is not deemed to be taught by the specification or claims of this patent and for this reason the present invention is deemed to be patentable thereover.

United States Patent No. 5,747,560 was patented on May 5, 1998 to B. Christiani et al and assigned to Allied Signal Inc. on a "Melt Process Formation Of Polymer Nanocomposite Of Exfoliated Layered Material". This patent shows a composite material including a polymer matrix which comprises a melt processible polymer with a melt processing temperature of at least 220 degrees Centigrade. The composite material also includes dispersed platelet particles with an average thickness of less than 50 angstroms and a maximum thickness of about 100 angstroms which is of an onium chemical species bonded to them. This chemical species is selected from a specific group of onium compounds having a specific formula as set forth in the patent. The above patent does not show the novel composition of matter disclosed in the present invention of a polymer reinforced with nanocomposite material which can be formed into a blend where various mechanical properties can be carefully and accurately controlled by varying the polymers and nanocomposite polymers prior to the extrusion and during the extrusion by varying the process for forming thereof. This unique composition of matter is finally formed in such a manner that specific parameters

thereof such as mechanical properties can be carefully controlled by varying the mixing proportions with pure virgin polymers and copolymers. The unique process and reinforced polymer blend set forth in this invention is not in any way shown in United States Patent No. 5,747,560. As such the present invention is deemed to be patentably novel over the specification and claims of said patent.

United States Patent No. 5,747,591 was patented on May 5, 1998 to Z. Chen et al and assigned to Advanced Cardiovascular Systems, Inc. on "Polymer Blends For Use In Making Medical Devices Including Catheters And Balloons For Dilation Catheters". The polymer blend of the '591 patent is designed specifically for forming medical instruments such as catheters or balloons for dilation catheters. The polymeric blend component includes a first crystalline polymer component and a second softening polymeric component. The first two components are normally incompatible and the balloon material can include a third component for making them compatible to one another. This third component or compatibility agent facilitates the blending of the first two polymeric components together. This polymeric blend can be irradiated to enhance the properties of the balloon material to significantly increase the burst pressure thereof. The present invention provides a unique process for customizing the mechanical properties or other properties of a nanocomposite polymer blend in order to achieve specific target values for these mechanical properties or produce the mechanical properties

within a predefined parameter envelope when considering such properties as stiffness, elasticity, tensile strength and lubricity. These properties can be varied by carefully monitoring and controlling the mixing proportions of pure virgin polymers and copolymers while at the same time carefully monitoring and controlling the parameters of the extrusion process to further carefully control the final values for certain mechanical properties thereof. There is no disclosure of this method or composition of matter in United States Patent No. 5,747,591 and for this reason the present invention as claimed is deemed to be patentable thereover.

United States Patent No. 5,830,182 was patented on November 3, 1998 to L. Wang et al and assigned to Scimed Life Systems, Inc. on "Block Copolymer Elastomer Catheter Balloons". The block copolymer elastomer of the '182 patent is designed for making catheter balloons for medical purposes by radial expansion of tubing formed thereof under pressure. The block copolymer includes two or more hard segments of a polyester or polyamide and two or more soft components of polyether. The polyester hard segments are polyesters of an aromatic dicarboxylic acid and a specific diol. The polyamide hard segments are polyamides of C6 or higher carboxylic acids or higher organic diamines of C6 or higher aliphatic amino acids. The polyether soft segments are polyethers of C2-C10 diols. The block copolymer has a flexible modulus of less than 150,000 pounds per square inch. The block polymer has a thickness on the Shore D scale of greater than 60.

The percentage by weight of the block polymer attributable to the hard segments is a minimum of 50% and a maximum of 95%. In the present invention a unique composition of matter is disclosed for a nanocomposite reinforced polymer and blends produced thereof for engineering purposes as well as a method for providing such material with mechanical properties carefully controlled. These mechanical properties can include stiffness, elasticity, tensile strength and lubricity or other mechanical properties. They can be varied by metering the polymers and nanocomposite polymers prior to the extrusion as well as during the extrusion. The extrusion process can have the parameters thereof modified to vary the resultant mechanical properties in a predictable manner. These parameters so modified may include time, temperature, as well as overall cool-down time, as well as varying the draw-down extrusion ratio. In this manner a multi layer extrusion can be produced having mechanical properties in the final resultant nanocomposite reinforced polymer blend which are accurately controlled by varying these parameters as well as by varying the mixing proportions with pure virgin polymers and copolymers. In this manner a proprietary process is disclosed which provides a method for customizing of the mechanical properties of such a nanocomposite reinforced polymer blend to reach specific values or to reach specific evaluations within a minimal tolerance envelope as desired. In particular the process may allow certain values for mechanical properties to be achieved which may exceed the values of the individual components of the resultant polymer

blend and, as such, synergistically provide a resultant polymer blend. This unique method and the composition of matter produced thereby is patentably distinct from all aspects of the disclosure of United States Patent No. 5,830,182 and, for this reason, the present invention as claimed is not deemed to be taught by the specification or claims of this patent and for this reason the present invention is deemed to be patentable thereover.

United States Patent No. 5,877,248 was patented on March 2, 1999 to G. Beall et al and assigned to Amcol International Corporation on "Intercalates And Exfoliates Formed With Oligomers And Polymers And Composite Materials Containing Same". The method disclosed in this patent is for increasing the viscosity of an organic liquid by combining it with an intercalate complex of a phyllosilicate and polymer. The phyllosilicate so added has a water content of at least 4% by weight with an intercalant polymer. It is without an onium ion or silane coupling agent. In this manner it will form an intercalating composition with the total weight ratio of intercalant polymer to phyllosilicate of at least 1:20. Intercalation of the polymer between the adjacent phyllosilicate platelets of the intercalate is sufficient to space the adjacent phyllosilicate particles a distance of at least 5 angstroms. This intercalate is then combined with the organic liquid. The above patent does not show the novel composition of matter disclosed in the present invention of a polymer reinforced with nanocomposite material which can be formed into a blend where

various mechanical properties can be carefully and accurately controlled by varying the polymers and nanocomposite polymers prior to the extrusion and during the extrusion by varying the process for forming thereof. This unique composition of matter is finally formed in such a manner that specific parameters thereof such as mechanical properties can be carefully controlled by varying the mixing proportions with pure virgin polymers and copolymers. The unique process and reinforced polymer blend set forth in this invention is not in any way shown in United States Patent No. 5,877,248. As such the present invention is deemed to be patentably novel over the specification and claims of said patent.

United States Patent No. 5,880,197 was patented on March 9. 1999 to G. Beall et al and assigned to AMCOL International Corporation on "Intercalates And Exfoliates Formed With Monomeric Amines And Amides; Composite Materials Containing Same And Methods Of Modifying Rheology Therewith". The intercalate which is formed by contacting a layered material having adjacent platelets thereof with a moisture content of at least 4% by weight with an intercalating composition comprising the layered material, water and an intercalate monomer having a functionality selected from the group consisting of an amine, an amide and mixtures thereof. The intercalate has a weight ratio of intercalate monomer to layered material of at least about 1:20 to achieve sorption and complexing of the intercalate monomer between adjacent spaced layers of the layered material as

necessary. The present invention is distinguishable from this patent since the present invention discloses a uniquely configured nanocomposite reinforced polymer or blend which is produced for specific engineering purposes having enhanced mechanical properties such as stiffness, elasticity, tensile strength and/or lubricity. In the present invention these parameters can be controlled by metering the polymers and the nanocomposite polymers prior to and during extrusion. This process provides a nanocomposite reinforced polymer blend which can be accurately controlled within specific parameters. Such a material is not in any way taught by United States Patent No. 5,880,197 and, as such, the present invention is deemed to be patentably distinguishable thereover.

United States Patent No. 5,951,941 was patented on September 14, 1999 to L Wang et al and assigned to Scimed Life Systems, Inc. on "Block Copolymer Elastomer Catheter Balloons". The method for forming a catheter balloon from a block copolymer elastomer shown in this invention defines the balloon to have proximal and distal waist portions and a central body section. It includes radially expanding a length of polymer tubing under pressure such that the length of the tubing has proximal and distal portions which are stretched to a reduced diameter and an unstretched central portion. The radially expanding step is achieved by expanding the tubing in a mold such that the balloon body is formed from the unstretched central portion of the tubing and the proximal and distal waist portions of the balloon are

formed from the stretched proximal and distal portions thereof. The polymer is preferably a black polymer polyamide/polyester block or a polyester/polyether copolymer. The present invention provides a unique process for customizing the mechanical properties or other properties of a nanocomposite polymer blend in order to achieve specific target values for these mechanical properties or produce the mechanical properties within a predefined parameter envelope when considering such properties as stiffness, elasticity, tensile strength and lubricity. These properties can be varied by carefully monitoring and controlling the mixing proportions of pure virgin polymers and copolymers while at the same time carefully monitoring and controlling the parameters of the extrusion process to further carefully control the final values for certain mechanical properties thereof. There is no disclosure of this method or composition of matter in United States Patent No. 5,951,941 and for this reason the present invention as claimed is deemed to be patentable thereover.

United States Patent No. 6,010,521 was patented on January 4, 2000 to J. Lee et al and assigned to Advanced Cardiovascular Systems, Inc. on a "Catheter Member With Bondable Layer". The catheter member making use of a bondable layer disclosed in this patent includes an elongated shaft with proximal and distal ends. A port is defined in the distal end and a guidewire lumen extends therein in fluid flow communication with the port in the distal end. A guidewire lumen including a

multilayered tubular member has an inner layer formed of a lubricous polymer material and an outer layer formed of a polyolefin polymerized with as much as 35% by weight of a polymer having reactive monomer groups. The outer layer has a melting point lower than the inner layer and the catheter part fusion is bonded to the outer layer of the multilayered tubular layer. In the present invention a unique composition of matter is disclosed for a nanocomposite reinforced polymer and blends produced thereof for engineering purposes as well as a method for providing such material with mechanical properties carefully controlled. These mechanical properties can include stiffness, elasticity, tensile strength and lubricity or other mechanical properties. They can be varied by metering the polymers and nanocomposite polymers prior to the extrusion as well as during the extrusion. The extrusion process can have the parameters thereof modified to vary the resultant mechanical properties in a predictable manner. These parameters so modified may include time, temperature, as well as overall cool-down time, as well as varying the draw-down extrusion ratio. In this manner a multi layer extrusion can be produced having mechanical properties in the final resultant nanocomposite reinforced polymer blend which are accurately controlled by varying these parameters as well as by varying the mixing proportions with pure virgin polymers and copolymers. In this manner a proprietary process is disclosed which provides a method for customizing of the mechanical properties of such a nanocomposite reinforced polymer blend to

reach specific values or to reach specific evaluations within a minimal tolerance envelope as desired. In particular the process may allow certain values for mechanical properties to be achieved which may exceed the values of the individual components of the resultant polymer blend and, as such, synergistically provide a resultant polymer blend. This unique method and the composition of matter produced thereby is patentably distinct from all aspects of the disclosure of United States Patent No. 6,010,521 and, for this reason, the present invention as claimed is not deemed to be taught by the specification or claims of this patent and for this reason the present invention is deemed to be patentable thereover.

United States Patent No. 6,013,728 was patented on January 11, 2000 to Z. Chen et al and assigned to Advanced Cardiovascular Systems, Inc. on "Polymer Blends For Use In Making Medical Devices Including Catheters And Balloons For Dilatation Catheters". The polymer blends disclosed in this patent are used in making medical devices such as catheters or balloons for dilatation catheters. These are formed normally from a blend of polymer materials including a first crystalline polymeric component and a second softening polymeric component. These two components are normally incompatible and are rendered compatible by a third agent to facilitate blending of the two polymer components together. The first polymer can be a branched or straight chain polymer with a molecular weight of at least 5000. The second polymer can be a polyolefin, an ethylene copolymer or

a polyester block copolymer or a polyamide block copolymer. The third polymer component is preferably an ethylene copolymer. The present invention is distinguishable from this patent since the present invention discloses a uniquely configured nanocomposite reinforced polymer or blend which is produced for specific engineering purposes having enhanced mechanical properties such as stiffness, elasticity, tensile strength and/or lubricity. In the present invention these parameters can be controlled by metering the polymers and the nanocomposite polymers prior to and during extrusion. This process provides a nanocomposite reinforced polymer blend which can be accurately controlled within specific parameters. Such a material is not in any way taught by United States Patent No. 6,013,728 and, as such, the present invention is deemed to be patentably distinguishable thereover.

United States Patent No. 6,060,549 was patented on May 9, 2000 to D. Li et al and assigned to Exxon Chemical Patents, Inc. on "Rubber Toughened Thermoplastic Resin Nano Composites". The thermoplastic resin nanocomposite of this patent includes at least one thermoplastic engineering resin and an elastomeric functionalized copolymer of a C4-C7 isomonoolefin containing up to about 20 mole % of aromatic monomer units randomly spaced on the polymer chain as specifically set forth in the patent. It also includes an exfoliated phyllosilicate clay having cationic surfactants dispersed therein wherein the clay is present in the composition at a level of 0.5% to 10% weight

percentage based on the polymer content of the blend. The above patent does not show the novel composition of matter disclosed in the present invention of a polymer reinforced with nanocomposite material which can be formed into a blend where various mechanical properties can be carefully and accurately controlled by varying the polymers and nanocomposite polymers prior to the extrusion and during the extrusion by varying the process for forming thereof. This unique composition of matter is finally formed in such a manner that specific parameters thereof such as mechanical properties can be carefully controlled by varying the mixing proportions with pure virgin polymers and copolymers. The unique process and reinforced polymer blend set forth in this invention is not in any way shown in United States Patent No. 6,060,549. As such the present invention is deemed to be patentably novel over the specification and claims of said patent.

United States Patent No. 6,200,290 was patented on March 13, 2001 to R. Burgmeier and assigned to Schneider (USA) Inc. on "Dilatation Balloons Containing Polyesteretheramide Copolymer". The angioplasty device balloon shown in this patent has a single polymer layer comprising a blend of at least one polymer selected from each of Groups A and B. Group A consists of polyesteretheramide copolymers. Group B consists of polyamide polymers, polyester copolymers, polyurethane copolymers, polyethylene and combinations thereof. Also at least 20% by weight of the blend is a Group A polymer material and at least 2%

by weight of the blend is a Group B polymer material. The present invention provides a unique process for customizing the mechanical properties or other properties of a nanocomposite polymer blend in order to achieve specific target values for these mechanical properties or produce the mechanical properties within a predefined parameter envelope when considering such properties as stiffness, elasticity, tensile strength and lubricity. These properties can be varied by carefully monitoring and controlling the mixing proportions of pure virgin polymers and copolymers while at the same time carefully monitoring and controlling the parameters of the extrusion process to further carefully control the final values for certain mechanical properties thereof. There is no disclosure of this method or composition of matter in United States Patent No. 6,200,290 and for this reason the present invention as claimed is deemed to be patentable thereover.

United States Patent No. 6,210,396 was patented on April 3, 2001 to S. Macdonald et al and assigned to Medtronic, Inc. on a "Guiding Catheter With Tungsten Loaded Band". The guiding catheter of the '396 patent includes a tungsten loaded band. The basic construction of the catheter body includes the proximal tubular catheter shaft formed of a relatively stiff polymeric material. A radiopaque band made of polymeric material loaded with a radiopaque material of greater than 40% by weight is also included. A distal soft tip is formed of a relatively flexible polymer material. A tubular sleeve defines a tubular

sleeve lumen. The tubular sleeve fits coaxially with the radiopaque band, the catheter shaft distal end and the distal soft tip proximal end. In this manner the tube sleeve is melt compatible with the radiopaque band to form the catheter body. In the present invention a unique composition of matter is disclosed for a nanocomposite reinforced polymer and blends produced thereof for engineering purposes as well as a method for providing such material with mechanical properties carefully controlled. These mechanical properties can include stiffness, elasticity, tensile strength and lubricity or other mechanical properties. They can be varied by metering the polymers and nanocomposite polymers prior to the extrusion as well as during the extrusion. The extrusion process can have the parameters thereof modified to vary the resultant mechanical properties in a predictable manner. These parameters so modified may include time, temperature, as well as overall cool-down time, as well as varying the draw-down extrusion ratio. In this manner a multi layer extrusion can be produced having mechanical properties in the final resultant nanocomposite reinforced polymer blend which are accurately controlled by varying these parameters as well as by varying the mixing proportions with pure virgin polymers and copolymers. In this manner a proprietary process is disclosed which provides a method for customizing of the mechanical properties of such a nanocomposite reinforced polymer blend to reach specific values or to reach specific evaluations within a minimal tolerance envelope as desired. In particular the process

may allow certain values for mechanical properties to be achieved which may exceed the values of the individual components of the resultant polymer blend and, as such, synergistically provide a resultant polymer blend. This unique method and the composition of matter produced thereby is patentably distinct from all aspects of the disclosure of United States Patent No. 6,210,396 and, for this reason, the present invention as claimed is not deemed to be taught by the specification or claims of this patent and for this reason the present invention is deemed to be patentable thereover.

United States Patent No. 6,217,547 was patented on April 17, 2001 to J. Lee and assigned to Advanced Cardiovascular Systems, Inc. on "Lubricous And Readily Bondable Catheter Shaft". The catheter shaft of this patent is both lubricous and bondable and comprises an elongated shaft with proximal and distal portions. It has at least one segment fusion bonded to another catheter segment. The segment is formed of a polymeric blend having a lubricous high density polymeric component and a bonding polyamide polymeric component. The present invention is distinguishable from this patent since the present invention discloses a uniquely configured nanocomposite reinforced polymer or blend which is produced for specific engineering purposes having enhanced mechanical properties such as stiffness, elasticity, tensile strength and/or lubricity. In the present invention these parameters can be controlled by metering the polymers and the nanocomposite polymers prior to and during

extrusion. This process provides a nanocomposite reinforced polymer blend which can be accurately controlled within specific parameters. Such a material is not in any way taught by United States Patent No. 6,217,547 and, as such, the present invention is deemed to be patentably distinguishable thereover.

United States Patent No. 6,271,298 was patented on August 7, 2001 to C. Powell and Assigned to Southern Clay Products, Inc. on a "Process For Treating Smectite Clays To Facilitate Exfoliation". This patent discloses a method for treating clays including the preparation of a nanocomposite by intercalating a smectite clay with a quaternary ammonium ion. The intercalated clay is then exfoliated into a polymer mix which enables augmented exfoliation. The smectite clay is edge treated with negatively charged organic molecules prior to exfoliation. The above patent does not show the novel composition of matter disclosed in the present invention of a polymer reinforced with nanocomposite material which can be formed into a blend where various mechanical properties can be carefully and accurately controlled by varying the polymers and nanocomposite polymers prior to the extrusion and during the extrusion by varying the process for forming thereof. This unique composition of matter is finally formed in such a manner that specific parameters thereof such as mechanical properties can be carefully controlled by varying the mixing proportions with pure virgin polymers and copolymers. The unique process and reinforced polymer blend set forth in this invention is not in any way shown in United States

Patent No. 6,271,298. As such the present invention is deemed to be patentably novel over the specification and claims of said patent.

The above art constitutes the closest prior art of which applicant is aware. In view of the arguments submitted hereabove, applicant deems that the present application as currently pending is in condition for allowance and such action is hereby respectfully solicited.

Respectfully submitted,

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